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SOVIET REPORT ON MONTREAL INTERNATIONAL PHYSIOLOGICAL CONGRESS

G. D. Smirnov

En route to Montreal to attend the 19th International Physiological Conference, the USSR delegation stopped in Quebec, where they were met by Quebec University professors R. Bernard and E. Page. From Quebec, the USSR delegation took a train to Montreal.

Montreal's original French aspects have been obliterated by the American way of life, which is being energetically introduced. Side by side with quiet ancient streets of the French city, there is a local Broadway filled with a noisy crowd and equipped with lit-up advertisements. There is also a street of banks, which the Montrealers jocularly refer to as "our Wall Street." One has the impression of a lively and rapidly developing economic activity. However, we were able to convince ourselves again that wherever capitalism reigns the results of economic development are of little use to the people. In a country like Canada where all prerequisites exist for increasing the material well-being of the nation, the cost of living rises from month to month.

We arrived at Montreal a week before the beginning of the congress. During the time which was available to us, we visited the scientific institutions of Montreal. Our delegation was received by representatives of both local universities, McGill University and the French University of Montreal.

At McGill University, we visited the Department of Physiology. A pupil of I. P. Pavlov, the prominent specialist in the field of nutritional physiology, B. P. Bakkin, was head of this department for many years. At present, the type of research being done in this department has completely changed. The principal problems in which the head of the department, Dr F. McIntosh, and his assistant, D. Burns, are interested, is the chemistry of the transmission of excitation at synapses of the nervous system and the electrophysiology of the central nervous system.

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The range of problems being investigated at the comparatively new research institute which is concerned with biochemical problems is particularly extensive. At this institute, we were told about investigations upon the origin of cancer on the biochemical basis of the permeability of intestinal walls, on the biochemistry of the central nervous system, and even on chemical methods of improving the structure of the soil. One must say that Dr J. H. Quastel, the head of this institute, is able to find original ways of solving the most diverse problems.

At the University of Montreal, the USSR delegation visited the Institute of Experimental Medicine and Surgery, which is headed by Dr H. Selye, and the Department of Physiology, which is headed by E. Robillard. Dr Selye demonstrated interesting results in the investigation of the action of hormones on pathological processes both under experimental conditions and in clinical application. In Robillard's department, we familiarized ourselves with the organization of instruction and with work on the investigation of the permeability of the renal barrier for microorganisms. This work is being carried out with the application of tracer atoms.

We were greatly impressed by our visit to the Institute of Neurology, which is headed by the famous neurologist and neurosurgeon, B. Penfield. Clinical work and thorough experimental work are well coordinated at this institute. Penfield's associates, H. H. Jasper, who heads research in the fields of electroencephalography and physiology, Dr F. McNaughton, head of the neurological department, and Dr K. Elliott, under whose direction research in the field of neurochemistry is being conducted, are prominent specialists in their field. They assure a many-sided treatment of the most important problems of clinical neurophysiology and neuropathology.

Penfield's attitude toward Russian physiology is demonstrated by the fact that the name of Pavlov, together with several of the world's greatest neurologists, is inscribed on the wall in the main entrance hall of the institute. Penfield says that Pavlov's deep penetration into the physiological mechanism still guides the thinking of clinicians.

During World War II, Penfield was a member of a US military mission which visited the USSR. A portrait of N. N. Burdenko in Penfield's study commemorates the meeting of these two famous neurosurgeons.

A considerable portion of the reports and communications presented at the congress dealt with the problems of hormonal regulation, the role of vitamins, changes in metabolism which take place at low and high temperatures, tissue metabolism, investigations in the field of pharmacology, and research in the field of pathological physiology. Work on the physiology of the sensory organs and of the nervous system was represented to a relatively small extent. Work on the physiology of higher nervous activity was even less represented. Problems connected with the mechanism of the action of insulin were discussed in great detail. In the great number of reports on the functioning of suprarenals, particular attention was paid to the effect of cortisone on tissue metabolism and on the development of some pathological processes. Many reports dealt with problems of hormonal correlation between the activity of the suprarenals, the pancreas, and the hypophysis.

A considerable number of new facts connected with hormonal metabolism and with the effect of hormones on specific processes in tissues was obtained by using the method of tracer atoms.

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A special symposium was devoted to the mechanism of the formation of thyroid hormones. Reports by R. P. J. Michel (France) and E. D. DeRobertis (Uruguay) clarified the course of enzymatic processes and of processes of hormonal regulation, which have a bearing on the formation and excretion of thyroxin. However, in these reports, as well as in other reports presented at the meeting, hormonal regulation was treated without considering the central nervous system. This restricted to a considerable extent the theoretical and practical usefulness of the work reported.

In a series of investigations dealing with metabolism, the most important place was occupied by those which presented results on the reactions of the organism to low temperatures. Among the reports presented at a special symposium on this subject, those by L. P. Dugal (Canada), C. Kayser (France), O. G. Edholm (England), and a number of other scientists discussed changes in the blood circulation and the role of hormones and vitamins in the adaptation of the human organism and the organism of animals to low temperatures. However, the role of the hypothalamic region in adaptation to cold and, what is most important, the regulating effect of the cerebral cortex on the processes of adaptation have not been investigated. E. F. DuBois (US) in his introduction to the symposium mentioned the necessity of conducting investigations of this type.

Many of the investigations upon which reports were given had been carried out on human beings. M. Brown and J. D. Hatcher (Canada) in investigating the adaptation of Canadian Eskimos to the cold, established the presence of tisuual adaptation of the metabolism, an increased rate of blood circulation, and a hyperfunction of the thyroid gland. K. Rodahl (Alaska) reported on an investigation conducted by him in which he studied the nutritional requirements of US soldiers under Arctic conditions as compared with the diet of Eskimos. The great number of reports given on the problem of adaptation to cold indicate that particular attention is being paid to this subject in the US, Canada, and England.

The program of the sectional meeting at which problems of the adaptation to high temperature were discussed was much more modest. The reports given by South African, British, American, and other investigators dealt with problems of hygiene rather than with the mechanisms of reactions of an organism to high temperatures.

Without considering in detail the reports on the biochemistry of the nervous system, of muscle contraction, of immunological reactions, etc., the organization of separate biochemical congresses since 1948 has not interfered with the close collaboration between biochemists and physiologists. This has been demonstrated by the great number of reports in the field of biochemistry presented at the Montreal congress.

A special meeting was devoted to the important subject of hemodynamics of small blood vessels. In the reports given at that meeting, the biological functions of small blood vessels, the processes of metabolism through the capillary walls, and the characteristics of blood circulation in muscles were discussed. Special problems of the disturbances of hemodynamics and of the factors which produce these disturbances were discussed at a meeting devoted to problems of high blood pressure and arteriosclerosis. Research in this field, as shown by the reports, was limited to the analysis of the peripheral humoral factors which bring about hypertension. They did not contribute much to the prophylaxis and therapy of the diseases in question in human beings.

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Another symposium was devoted to problems of the physiology of reactions which arise in the reflexogenic regions of the heart, of large blood vessels, and of the lungs. The well known Belgian physiologist, C. Heymans, presented a review in which the contemporary status of knowledge of receptors of the sino-aortic region was discussed. Other reports dealt with the significance of vascular and pulmonary receptors in the activity of a number of physiologically active compounds. This subject was discussed in a report given by G. S. Dawes (England). Y. Zotterman (Sweden) and D. Whitteridge (Scotland) discussed in extensive reports the results of their work on the detailed electrophysiological analysis of impulses which arise in various receptors of the regions discussed at the symposium.

The reports on problems of nutritional physiology dealt with the mechanism of resorption, the secretion of digestive enzymes, the gastric digestion in fish, the effect of cortisone on the functioning of the gastrointestinal tract, and other problems. The scientific significance of a report by W. H. Olson and Anna Bridgwater (US) on the characteristics of gastric secretions of prisoners at an American penal institution remains obscure.

Among reports on the regulation of respiration, a considerable number of data dealing with observations made on human subjects were presented. The reports in this subdivision dealt with adaptation to lower barometric pressure, lack of oxygen, and increased concentrations of carbon dioxide, in other words, with problems which are directly connected with applications of modern technology.

Interesting reports on the physiology of the nervous system were read at the symposium on mechanisms which regulate the position of the body in space. The major part of sectional reports on the physiology of the nervous system dealt with the investigation of electrical phenomena arising in individual nerve and muscle fibers. The techniques of such investigations have reached a very high level so that the experimenter may, without particular difficulties, measure changes in the potentials of nerve cells by introducing into these cells a capillary electrode with an opening 0.5 micron wide. However, the reports showed that these ingenious methods have not contributed much to an understanding of the function of the neurons or the nature of the complicated curve of potential changes registered in the cerebral cortex, i. e., the indications of the electroencephalogram.

In a number of reports, the contemporary status of problems dealing with the role which acetylcholine metabolism plays in nerve activity was considered.

R. H. Beutner and T. C. Parnes (US) presented new experimental data which demonstrated the electrogenic activity of acetylcholine. This activity is particularly noticeable in its effect on the natural lipoproteins obtained from nerve tissue. In a report by F. C. McIntosh, an ingenious method was described by which he was able to measure the diffusion of acetylcholine from the cerebral cortex and to demonstrate convincingly the dependence of the acetylcholine metabolism on the functional condition of the nervous system. One must also mention the paper by the Yugoslav physiologist, A. O. Zupancic, entitled "The Mechanism of the Action of Acetylcholine and of Other Biologically Active Substances." Zupancic advanced under the guise of a new theory the assumption on the identity with cholinesterase of proteins which are sensitive to acetylcholine, although this assumption had already been made almost 10 years ago by the Soviet pharmacologist, V. M. Karasik, and had been expressed by Karasik in a number of papers.

Of particular interest to our delegation was the symposium on the physiological theory of habit formation, in other words, on the learning process. The term "learning" is used in Anglo-Saxon countries to express the concept of the formation of conditioned reflex connections in the sense of Pavlov's teaching.

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The British investigator J. Z. Young, in an extensive report to the symposium, presented his observations on the development of conditioned reflexes in the octopus and the role of various divisions of the central nervous system of the octopus in the formation of the connections pertaining thereto. Although all conclusions of Young's experimental data coincided with the results of observations made by Pavlov and his pupils on other animals, Young for some reason avoided describing the phenomenon discussed by him as the formation of a conditioned reflex. He did not mention Pavlov's name once.

Pavlov's name was mentioned repeatedly in a report made by R. W. Sperry (US) with the single purpose of refuting Pavlov's theories. After presenting the theses of his report, which was supposed to deal with the connection between the process of learning and the regeneration of nerves, Sperry warned the audience that he would discuss something entirely different. Substantially, his report amounted to a criticism of the Pavlovian principle of the formation of conditioned reflex connections and to an attempt at proving the role of emotional aspects in the potentiation of nerve energy at the centers involved followed by a liberation of this energy in response to the action of a conditioned irritant.

An informative report was given by A. K. McIntyre (New Zealand), who presented data which clarified the actual physiological mechanisms of the formation of linkages in the cerebral cortex and on the mechanism of memory, which is based on the formation of these linkages. For the synaptic transmission of irritation, the subsequent short period of increased excitability is typical. McIntyre, in work carried out with J. Eccles, demonstrated that in nerve chains with one or more inserted neurons and consequently with two or more synapses, the period of raised excitability increases and reaches tens of minutes. If one considers the extreme complexity of neuron linkages in the cerebral cortex, one may assume that this mechanism participates in preserving traces of the excitation for many years; in other words, it participates in the process of memory.

The subject matter of reports on higher nervous activity presented at the congress indicates that foreign physiologists approach this problem with extreme caution, if not timidity. The main reason for this is the existing division of spheres of influence between science and religion. The physiologists headed by their most prominent representatives, C. Sherrington, E. Adrian, A. Murrill, and others, have assumed the dualistic approach to physiological research, which involves a recognition of limits to physiological investigation. For that reason, the real physiologists, as they describe themselves, concentrate on the analysis of the processes investigated, while their attempts at synthesis are restricted to a purely mechanical and formalistic review of the data obtained.

The report presented by Academician K. M. Bykov at the symposium was naturally based on an entirely different approach. Bykov outlined the investigations by him and his group and demonstrated the limitless prospects of acquiring a knowledge of the psyche and of exerting an influence on the diseases of the psyche which is opened up by work along the lines of Pavlov's teaching. The results of work on higher nervous activity on the basis of Pavlov's teachings were also reported in other communications given by USSR representatives. The reports given by USSR scientists who participated at the congress were received with great interest and attention.

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Some postulates of Pavlovian physiology were developed in a report presented by the Polish physiologist W. Missiuro on the investigation of processes of physical labor. The Polish delegates were unable to obtain transit visas in time for passage through the US. They arrived in Montreal a day before the closing of the congress. Nevertheless, Missiuro had time to present his report, which resulted in a lively discussion.

The evident interest by participants at the congress in the reports illustrating the achievements of Pavlovian physiology served in some measure as an incentive for publication in a sensational Montreal newspaper of an article under the catching title "A United States Scientist Exposes the Secret of the Brain Washing Carried Out by the Russians." The newspaper stated that a specialist on conditioned reflexes who is active in the US had explained, in response to a request made by the US Secret Service, why many prisoners of war who return from North Korea had become adherents to Communism. According to the newspaper, this specialist asserted that Pavlov's teaching on conditioned reflexes can be used for the purpose of converting prisoners of war to Communism.

The newspaper article resulted in a protest on the part of the management of the congress. On the same day, all delegates received a letter signed by the president of the congress, the president of the local organizational committee, and the secretary of this committee in which the officials mentioned dissociated themselves from the newspaper dispatch and expressed their regret that this dispatch, which must have made a disagreeable impression on the Soviet delegates, had been published. This letter was one of the many expressions of the friendly attitude of foreign scientists toward the Soviet delegation.

The oldest American physiologist, C. Carlson, who knew Pavlov personally, proposed that a meeting between American and Soviet scientists be arranged. This meeting took place on the day when the congress was closed. At the meeting, which was well attended, we met scientists from the US, Canada, South America, and Mexico. The well known American physiologist H. Grundfest read a letter by Carlson, who had to leave Montreal prior to the meeting. In this letter, Carlson wrote about the necessity of terminating the cold war in the field of physiological science and of establishing mutual understanding between American and Soviet scientists. A lively and friendly discussion continued for more than 3 hours at this meeting.

On the day after the closing of the International Physiological Congress, an International Conference of Pharmacologists took place. The Soviet scientists also participated in this conference. A number of reports presented at the conference dealt with the action of pharmacologically active substances on sympathetic ganglia. The British pharmacologist, W. Paton, proposed a classification of substances which act on ganglia. Interesting information, which developed further the well known work of Bykov and V. N. Sheveleva, was contained in the communication by S. Marrazzi (US) dealing with the action of adrenalin on sympathetic ganglia and with the interrelationships between adrenalin and acetylcholine in synaptic transmission.

Of great interest was the report by the famous Italian pharmacologist D. Bovet on the action on the central nervous system of substances which inhibit ganglion transmission. A clarification of the mechanism of the action of a number of quaternary ammonium compounds was combined in his report with an important conclusion confirming the acetylcholine mechanism of the transmission of impulses in the central nervous system. The balance of the reports presented at the conference dealt with the pharmacology of renal tubular transport mechanisms. This subject is very important at present. During

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recent years, a number of substances have been introduced into medical practice which stimulate the secretory activity of the renal tubules or selectively inhibit the elimination of definite substances such as antibiotics.

On 6 September, our delegation went to Toronto University. We familiarized ourselves with the department directed by Prof C. Best, with the Institute of Hygiene, which supplies antibiotics, dry plasma, and hormonal and other medical preparations, and with the newly opened model children's clinic of the university. Some of the delegation's members, headed by Prof V. A. Engel'gardt, visited Laval University in Quebec, where problems of metabolism and of adaptation of the human organism to low temperatures are investigated.

On the way back to the USSR, we took advantage of the acquaintanceship with French physiologists at the congress by visiting the Neurophysiological Institute of the College de France. The director of this institute, the famous physiologist A. Fessard, in a comparatively short time (the institute has existed for 5 years), has organized a group which perfectly combines electrophysiological and morphological methods of investigation in its work. Fessard's group attempts to solve problems of general physiology, particularly those pertaining to the origin and significance of bioelectrical activity. The methods of comparative physiology used by members of this group were of considerable interest to us, because they reminded us of investigations conducted in some of our laboratories at Moscow and Leningrad.

Our delegation also visited the Institute of Physiology at the Sorbonne. After being cordially received by the scientific personnel of this institute, we had the opportunity of familiarizing ourselves with interesting work being carried on in the fields of electrophysiology, metabolism, and physiology of vision.

The most important thing we observed in Paris, Montreal, Toronto, and London was the friendly attitude of scientists from all countries. Our participation at the Montreal congress and our contacts with foreign scientists have undoubtedly contributed to mutual confidence and understanding. Our trip abroad will therefore promote peace, a prerequisite for the success of genuine science in working for the benefit of humanity.

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